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(Under this application, which was originally made under Section 91 of the Patents and Designs Acts, 1907 to 1932, a Specification was laid open to public inspection on July 23, 1938.)

## COMPLETE SPECIFICATION

### Improvements in the Construction of Curved Plywood Shells for Use in the Manufacture of Barrels, Casks and the like

I, FREDERICK WALTER RUDOLPH LEISTIKOW, of the firm of Brewer and Son, Patent Agents, 33, Chancery Lane, W.C.2, a British Subject, do hereby declare the nature of this invention (a communication from N. V. VERMA, a Dutch Company, of Keulsehekade 216, Utrecht, Holland), and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the construction of curved plywood shells, intended for use in the manufacture of barrels, casks and like containers. By the term "plywood," we mean a three- or more-ply sheet made of thin layers of wood secured together by adhesive prior to the commencement of the shell-forming operation, as distinct from a material in which superposed layers of veneer are caused to adhere together during the formation of the curved shell.

One object of the invention is to enable perfect cylindrical shells of plywood to be made, which have no tendency to straighten out again after being bent to the cylindrical form even though their edges may not be interconnected immediately after bending, so that the shells may be nested for transport.

Another object of the invention is to make barrels, casks and the like of plywood of a very strong and stiff character, especially resistant to internal pressure, shocks and rough handling.

The usual practice in the manufacture of shells for barrels, casks and like articles is to glue together a number of layers of veneer with the grain of each layer at right angles to that of the next, and then subject the sheet thus obtained to pressure and heat. Thereafter the outer surface of the sheet is moistened and exposed to the action of a jet of steam followed by deformation of the sheet under heating and pressure exerted in a bending machine. A known modification of this method consists in drying the multiply sheet after adhesion of the layers, preforming the sheet and then moistening its surface with water and exposing it to the action of a jet of steam, the mould-

ing action being completed by subjecting the sheet to heat and pressure again.

It has hitherto been the practice to arrange that the grain in one or both outer layers of the sheet constitutes a generating line of the cylindrical surface of which it forms a part. If the fibres in both outer layers are straight, i.e. if they are parallel to the generating lines, the shells cannot be very strong, because when bent, it is not possible for both outer layers to take up any considerable tensile or compressive stresses directed at right angles to the generating lines.

The invention provides a method of manufacturing curved shells for use in the manufacture of casks, barrels and like containers from a sheet of plywood which consists in moistening said sheet superficially on both sides, as by dipping into lukewarm water, applying one end of said sheet to a heated core of cylindrical or substantially cylindrical form with the direction of the fibres of both outer layers of the sheet at right angles to or approximately at right angles to the axis of the core, holding the end of the sheet to the core and effecting relative movement of the sheet and core, as by rotating the core, so as to wrap the sheet tightly around the core without however applying heat to its outer surface and then leaving the sheet in position on the core for a sufficient time to permit the outer surface of the sheet to attain a visibly dry condition.

It is essential to the invention that not only should the grain in both outer layers of the sheet extend circumferentially or nearly so with respect to the core, but that the sheet should be moistened on both sides prior to application to the core and that one side only of the sheet should be heated, namely the inner side which comes into intimate contact over its entire surface with the heated core. In Specification No. 23951/97 is described a process for making barrel shells from plywood sheets in which the grain of both outer layers extends circumferentially. In this case, however, the outer layer of the sheet only was moistened and said outer layer was also steam heated before the sheet

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was passed into a bending machine in which it was bent into a cylindrical shell.

By using the method according to the invention a barrel shell or like article 5 may be manufactured in a simple manner and by means of cheap implements, while the shell itself has a considerably larger strength and stiffness than a shell, even of greater thickness, made in the usual 10 manner by bending a sheet of plywood or the like so as to have the fibres of the outer layer arranged in the longitudinal direction of the shell. Since the products made in this manner have no tendency to 15 regain the original flat shape, shells may be made and kept on stock, which is of great advantage. They may also be nested for shipping purposes and can be finished after delivery to form a complete 20 container. Due to this circumstance a considerable reduction in freight charges is obtained.

In practice the invention may be carried into effect by immersing a flat plywood sheet in water, preferably having 25 a temperature which can comfortably be borne by the hand, and then inserting the sheet between two metal rolls one of which is heated internally by steam or other 30 means and is provided with hook-shaped members arranged axially on the roll and adapted to engage one edge of the sheet and hold it fast, the sheet being so applied to the heated roll that the fibres of 35 both outer layers of the sheet extend at right angles to the axis of the said roll. Thereafter the rolls are caused to rotate, while at the same time the other roll is pressed upon the heated roll, e.g. by 40 hand. After the sheet is completely bent round the heated roll, the latter is stopped and the sheet is left in this position until the outer surface has dried to a visible degree. The sheet is then removed from 45 the rolls and thereafter retains its curved shape, which may be explained by the fact that the cells of the wood in the concave side are weakened by the moisture and are permanently deformed, the moisture at 50 this side being squeezed out and evaporated due to the influence of the heated core. The cells at the convex side of the plate remain humid for a longer time, swell up and are permanently 55 stretched. At the edges of the sheet it

may be observed that the layers do not shift relatively to one another and remain fixed in this position on drying.

The invention includes a bent plywood shell made by the method above referred to. Such shells are characterised by the 60 deformed character of the cells at the concave side of the plate, which may be established by observation of the manufactured article, and also by the stretched 65 character of the fibres at the convex side of the shell.

The method according to the invention is of course applicable to the manufacture of curved plywood shells for the manufacture of articles other than barrels or 70 casks, for example plywood boxes suitable for shipping flowers, fruit and the like.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:— 75

1. A method of manufacturing curved shells for use in the manufacture of casks, 80 barrels and like containers from a sheet of plywood which consists in moistening said sheet superficially on both sides, as by dipping into lukewarm water, applying one end of said sheet to a heated core 85 of cylindrical or substantially cylindrical form with the direction of the fibres of both outer layers of the sheet at right angles to or approximately at right angles to the axis of the core, holding the end 90 of the sheet to the core and effecting relative movement of the sheet and core, as by rotating the core, so as to wrap the sheet tightly around the core without however applying heat to its outer surface 95 and then leaving the sheet in position on the core for a sufficient time to permit the outer surface of the sheet to attain a visibly dry condition.

2. A curved plywood shell when made 100 by the method claimed in Claim 1.

3. The method of making curved plywood shells substantially as described herein with reference to the foregoing 105 example.

Dated this 22nd day of January, 1938.

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